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ABSTRACT

This pilot study used a task-analyzed performance base curriculum as an intervention on the gross motor development of 24 children aged three to six, 15 in a treatment group, 9 in a control group. Pre- and post-training data on gross motor development (relating to 10 motor skills) were collected using the Ohio State University Scale of Intra Gross Motor Assessment (OSU-SIGMA). Treatment group subjects were instructed in skills relating to the those measured by the OSU-SIGMA by preservice physical education majors in eight weekly 40-minute sessions. Post-training data indicated that treatment group subjects improved on running, throwing, catching, jumping, and ladder climbing, while control group subjects showed no improvement between pre- and post-training measures. It is concluded that even inexperienced teachers with minimal instructional time can establish gains that exceed the usual rate of normal gross motor development through the use of a highly structured instructional program. Tables of pre- and post-test results are presented. (CB)

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THE EFFECTS OF A PERFORMANCE BASE CURRICULUM ON THE GROSS MOTOR DEVELOPMENT OF PRESCHOOL CHILDREN DURING TEACHER TRAINING: A PILOT STUDY

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Abstract

In this pilot study a task-analyzed performance base curriculum (PBC) served as an intervention on the gross motor development of preschool-aged children. The curriculum was taught to 15 treatment group children. Nine children of similar background served as control group subjects. Data on gross motor development were collected using the Ohio State University Scale of Intra Gross Motor Assessment (OSU-SIGMA). All subjects were pre and posttested by two trained observers. The SIGMA is directly related to the PBC Subjects in the control group received no formal instruction. Treatment group subjects were instructed by preservice physical education majors. Mann-Whitney U test results showed that control group did not improve from pretest to posttest on any of the 10 motor skills. However, treatment group subjects improved on running, throwing, catching, jumping, and ladder climbing ($p<.05$). Between-group posttest differences ($p<.05$) were found on throwing and catching. Pretest sex differences in the treatment group were reduced, as indicated by the posttest data.

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Introduction

In teacher education programs across the country, students are spending more time than ever before in direct contact with children prior to their student teaching experiences. McIntyre's (1983) review of research on field experiences in teacher education suggested that there is reasonable content validity for their inclusion in such programs, supporting the popular assumption that one learns to teach by practicing teaching. However, in physical education teacher education this fascination with such "field experience" appears to be less than intense (Placek & Silverman, 1983). Locke (1984) has argued that "This may be just as well, since it is apparent that teacher educators everywhere have much to learn about the proper use of this program component." (p. 28). It may be that field experiences are potentially effective vehicles for preparing teachers, but we have yet to determine the most effective way to use them.

The subject matter content taught by preservice physical education teachers during practicum experiences is one variable that often is not controlled systematically by those who design and supervise practicums. In recent years, Experimental Teaching Units (ETUs) (Graham, 1983; Paese, 1986) have been used in teaching research projects that focused on teacher effectiveness. An ETU is a possible solution to controlling the subject matter variable. According to Graham (1983) "All the teachers in an ETU

study teach the same content and are typically provided with the rationale for the unit, specific performance objectives, pretest for students, sample posttest questions, and a variety of instructional materials." (p. 245). To date all ETU research projects in physical education have revolved around the teaching of a single novel task (Graham, 1983). For example, Paese (1986) studied the differences between field experience interns and student teachers during a 20 minute ETU on a novel golf skill with fifth grade students. No significant differences were found between groups on pretest and posttest scores, Management time, Instructional time, Activity time, Student Motor Engagement, ALT-PE, or teacher feedback.

The present pilot project borrowed from the ETU concept, in part, by providing preservice teachers with individual pretest results, specific performance objectives, and instructional materials. The general purpose of this pilot study was to examine the effects of a structured, task-analyzed curriculum taught by preservice teachers on the fundamental motor skill development of preschool children. The study also attempted to address the following related questions:

1. Does a structured, task-analyzed curriculum approach taught by preservice teachers result in increased development in some skills more than others?
2. Are there sex differences in performance of students in a structural, task-analyzed teaching approach?
3. Can preservice teachers effectively use a structured, task-analyzed curriculum approach so as to produce

significant improvements in children's gross motor development?

METHODS AND PROCEDURES

Subjects

The subjects were 14 boys and 10 girls between the ages of 3 and 6 years who had received written parental/guardian permission to participate in the study. Intact groups from separate University sponsored day care programs served as control and treatment groups. However, care was taken to ensure equal representation in terms of socio-economic background. The control group (N = 9) consisted of six boys and three girls (Mean age = 65.55 mo.; Mean wt. = 20.61 kg.). The treatment group (N = 15) included eight boys and seven girls (Mean age = 54.66 mo.; Mean wt. = 19.45 kg.). There was no significant between-group difference in weight, however, the control group was significantly older than the experimental group, $t(22) = 3.72$, $p<.05$. Mann-Whitney U tests were used to analyze pretest data for between-group differences; and sex differences within the treatment group. Results showed the control group subjects to have significantly ($p < .05$) more mature motor patterns in catching ($U = 30.00$) and jumping ($U = 49.00$). Significant ($p < .05$) sex differences within the treatment group were found on throwing ($U = 13.00$), catching ($U = 6.50$), and striking ($U = 16.00$).

Test Instrument and Data Collection

The Ohio State University Scale of Intra Gross Motor Assessment (OSU SIGMA; Loovis and Ersing, 1979) was utilized to collect data on the basic gross motor skill performance of the subjects involved in the investigation. The OSU SIGMA is a criterion-referenced assessment tool and, as such, is designed to examine the quality of an individual's performance on basic gross motor skills from a developmental point of view rather than from performance results.

Through the use of the SIGMA, 11 basic motor skills can be evaluated using criterion-referenced standards for walking (which was not included in this study), stair climbing, running, throwing, catching, kicking, jumping, hopping, skipping, striking, and ladder climbing. Each skill is divided into four performance levels ranging from Level I (least mature) to Level IV (most mature). Each level is defined by performance criteria stated in behavioral terms. In each skill, the four respective levels reflect the sequential motor development of each skill and a score of I, II, III, or IV is awarded for the predominant motor behavior. Reliability coefficients for each of the eleven SIGMA items were determined by a test-retest study (Loovis, 1975). Coefficients for both intra-, and inter-rater agreement were sufficient to justify use of the SIGMA.

The 24 subjects were individually pre and posttested on the 10 SIGMA items by two trained examiners. Test instructions as outlined in the SIGMA manual (Loovis & Ersing, 1979) were followed. Percent of intra and interobserver agreement for the

test examiners was calculated prior to both pre and posttest sessions. Reliability coefficients were particularly high ranging from 96.3% to 98.1%.

Research Design

In light of the intact nature of both groups the research design utilized for this pilot project was the "nonequivalent control group design." According to Campbell & Stanley (1966) this design is one of the most widely used experimental research designs in educational research.

Intervention

Treatment Group. Instruction for each child was based on the Performance Base Curriculum (PBC) developed by Loovis and Ersing (1979). The PBC is directly related to the SIGMA and provides Teaching-Learning Experiences (TL) for each of the 10 SIGMA skills. The TL's are sequentially arranged instructional activities based on task analysis. Teachers implementing the PBC were encouraged to use the TL's as a guideline. TL's may be changed or adapted to accommodate each child's rate of development. For example, children developing at a slower rate may require smaller intervals for a given skill such as reduced heights and distances, and increased size of objects. In some instances, it was necessary to omit intervals for skills where the child demonstrated accelerated development.

The intervention setting was a University-sponsored developmental motor laboratory. Eight weekly 40 minute sessions were held during the spring semester of 1986. Subjects with

similar pretest profiles were placed together in groups of four. Then each group of four students was randomly assigned to two instructors for the duration of the project. The instructors were enrolled in an Elementary Physical Education Methods course. They were provided with the pretest results for their children and were advised to direct their instruction primarily to those skills which had not yet reached a mature functional level.

The preservice teachers were trained in the use of the PBC during a four week period prior to the start of the lab sessions. Teachers were also required to submit weekly instructional plans. Thus, the degree to which the PBC was being followed was monitored by the lab instructor.

Control Group. While at their Day care program, subjects in this group received no formal instruction aimed at developing mature patterns of gross motor skills. This was verified by way of a) an interview with the Day care teachers, and b) periodic visits to the playground area at the time that control subjects had their daily "play time."

RESULTS AND DISCUSSION

Given the research design and the level of data (i.e., ordinal), results were analyzed statistically by way of Mann-Whitney U tests. No significant differences were found for the control group subjects from pretest to posttest on any of the 10 skills. Table 1 shows a comparison of the treatment group's pretest and posttest data. Significant ($p<.05$) improvements were

made on the following skills: running (U = 84.50); throwing (U = 150.00); catching (U = 198.00); jumping (U = 157.00); and ladder climb (U = 184.50). Significant ($p<.05$) between-groups differences on the posttest data existed on throwing (U = 41.50) and catching (U = 38.50) (see Table 2).

Insert Table 1 about here

Insert Table 2 about here

Insert Table 3 about here

The differences within the treatment group between boys and girls found on the pretest performances (in throwing, catching, and striking) did not stay the same for the posttest. Table 3 shows the posttest comparisons between boys and girls. Boys demonstrated a significantly ($p<.05$) more mature pattern in throwing and striking. Thus, it appears that the boys' pretest advantage in catching had disappeared by the end of the intervention period.

Insert Figure 1 about here

To provide further support for the differences in change from pretest to posttest, Figure 1 shows a graphic comparison of one-level improvements made across all skills for both groups. This would include a pupil's improvement from Levels I to II, II to III, and III to IV.

The nature of this pilot study limits the generalizability of the results. However, certain implications are evident. First, it would appear that inexperienced preservice teachers, given a limited amount of allocated instructional time (an approximate maximum of 320 minutes) can establish gains that exceed the usual rate of normal gross motor development through the use of a highly structured instructional program (i.e., the PBC). It is our estimation, that the lack of greater significant between-groups differences can, in part, be attributed to the small group sizes. In addition, a review of the treatment group subjects' absentee record during the intervention also showed that girls were significantly more absent than boys ($t[22] = 2.09$, $p<.05$). While speculative, girls might have contributed to the between-groups difference more had they been absent less often.

Second, girls may benefit more from involvement in such highly structured programs, such as the PBC. Sex differences found on the pretest data decreased as a result of involvement in the PBC program. Again, the absentee level of girls during the intervention may have influenced the outcomes. Thus, sex differences in skill levels established through culturally biased sex role learning could be minimized through highly structured practice opportunities.

Third, providing novice teachers with planned instructional exercises could let them experience directly the (lack of) improvements made as a result of their instruction. This could benefit them in their development as effective teachers,

particularly if successful teaching is defined in terms of student learning gains. While this project did not address the question as to where to place this type of experience in a teacher preparation it would seem that a practicum program providing the levels of student improvements obtained here with minimal prior instructional experience would fit in well early on in training programs, thus providing early opportunities for success in teaching.

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Table 1

Comparison of Pre- and Posttest Scores Within Treatment Group*

Variable	Pretest $\bar{X}$ Rank	Posttest $\bar{X}$ Rank	U/U'	p**
Stair climb	16.50	14.50	97.50	.239
Running	17.37	13.63	84.50	.023
Throwing	18.03	12.97	150.50	.035
Catching	21.20	9.80	198.00	.0002
Kicking	16.10	14.90	103.50	.342
Jumping	18.50	12.50	157.50	.007
Hopping	17.47	13.53	83.00	.063
Skipping	16.03	14.97	104.50	.353
Striking	15.13	15.87	107.00	.377
Ladder climb	20.30	10.70	184.50	.0006

* N = 15.
**One-tailed significance.
$p < .05$

Table 2

Comparison of Posttest Scores Between Groups

Variable	Pretest $\bar{X}$ Rank	Posttest $\bar{X}$ Rank	U/U'	p*
Stair climb	12.00	12.80	63.00	.374
Running	14.22	11.47	52.00	.051
Throwing	15.39	10.77	41.50	.037
Catching	15.72	10.57	38.50	.025
Kicking	10.83	13.50	52.50	.173
Jumping	13.50	11.90	58.50	.268
Hopping	12.39	12.57	66.50	.467
Skipping	11.78	12.93	61.00	.327
Striking	12.17	12.70	64.50	.403
Ladder climb	14.28	11.43	51.50	.114

* One-tailed significance.
$p < .05$

Table 3

Comparison of Posttest Scores Between Boys and Girls Within Treatment Group

Variable	Boys $\bar{X}$ Rank	Girls $\bar{X}$ Rank	U/U'	p*
Stair climb	8.75	7.14	22.00	.211
Running	8.06	7.93	27.50	.459
Throwing	6.00	10.29	12.00	.008
Catching	7.25	8.86	22.00	.205
Kicking	7.38	8.71	23.00	.257
Jumping	8.69	7.21	22.50	.234
Hopping	8.00	8.00	28.00	.500
Skipping	8.63	7.29	23.00	.255
Striking	6.00	12.00	12.00	.007
Ladder climb	8.25	7.71	26.00	.369

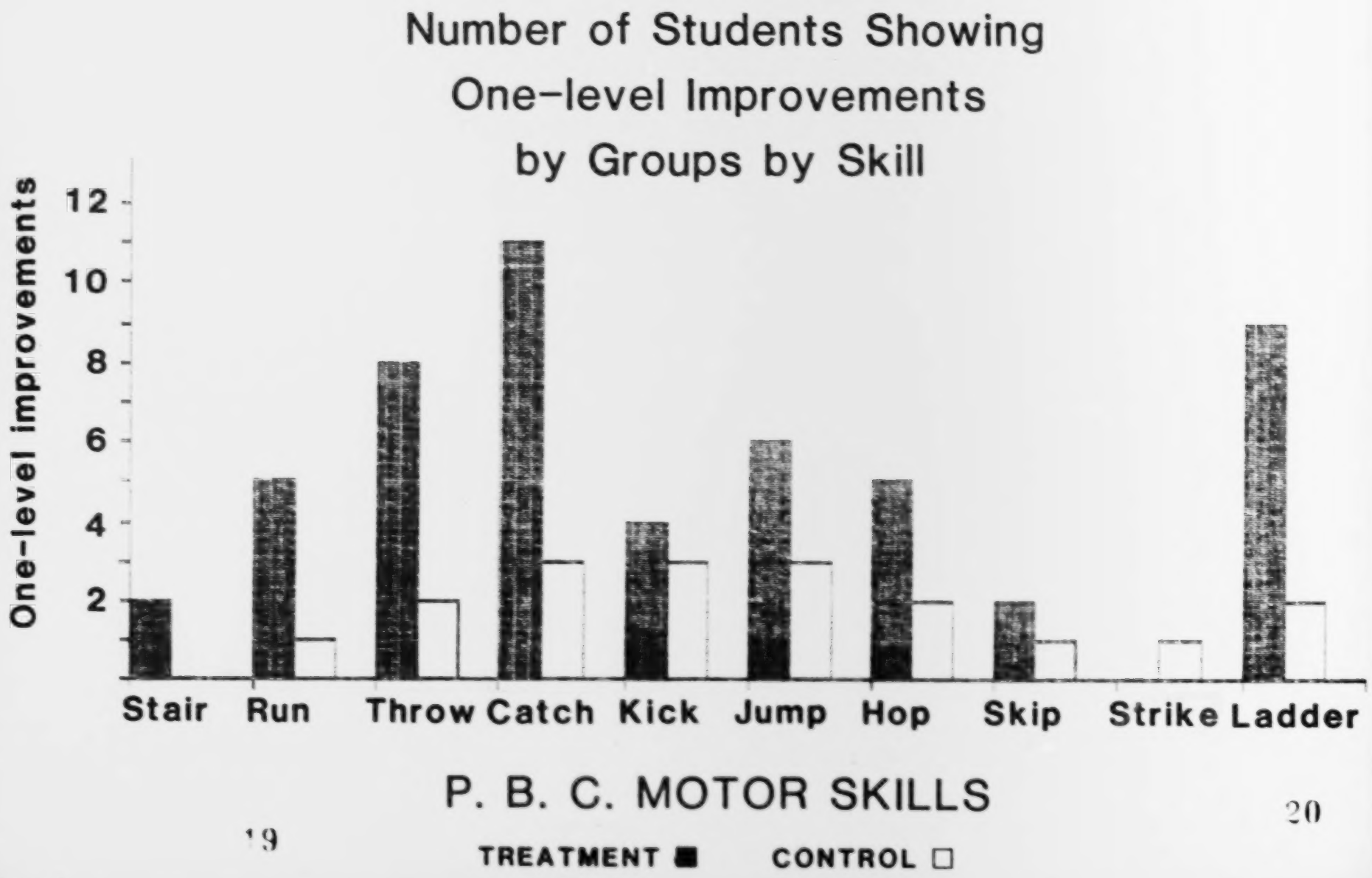
* One-tailed significance.
$p < .05$

Figure 1

The OSU Scale of Inter-Gross Motor Assessment
Summary Descriptions of Levels

Basic Skill	Level I	Level II	Level III	Level IV
Walking:	Ten second stand	Cruising	Walks-1 support	Opposition walk
Stair climb:	Creeps or animal walk	Two foot landing up, and down	Alternate up two foot landing down	Alternate up and down
Running:	Rapid walk	Wide Base	Egg beater	Non-support
Throwing:	Two hand push	Arm only, no foot movement	One sided/ homolateral	Opposition throw
Catching:	Arm stretch	Scoop	Vice squeeze	Cup Fashion
Kicking:	Part of walk	Stiff leg	Knee action kick	Knee action kick with follow through
Jumping:	Jump down	Jump in place no arms	Jump, improper arm action	Jump with arm action
Hopping:	Jump	Raises up on toe	Leg lift hop	Body lift hop
Skipping:	Runs/hops/ leap/gallop	Same side skip	Segmented alternate	Alternate skip
Striking:	One hand	Two hand chopping with	Rocking swing	Twisting swing
Ladder climb:	Climbs one	Two step climb	Alternate up, two down	Alternate step up and down

Figure 2


Number of Students Showing
One-level Improvements
by Groups by Skill
One-level improvements
12
10
8
6
4
2
Stair
Run
Throw
Catch
Kick
Jump
Hop
Skip
Strike
Ladder
P. B. C. MOTOR SKILLS
TREATMENT ■
CONTROL □